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ABSTRACT

Theoretical, diagnostic, and remedial issues related to polyglot dyslexia (i.e., difficulties in reading experienced in both languages spoken by bilinguals) are considered. Theoretical causes of dyslexia, research done with neuropsychological and neurolinguistic aspects of bilingualism, the literature on polyglot aphasia, and theoretical concerns regarding bilingualism are briefly addressed. It is suggested that two different languages may be confusing because of the dissimilarity of the two languages. If one language has a left-right movement on the page while reading, while another has a right-left orientation, the child may easily confuse "was" for "saw." The sparse literature on polyglot dyslexia in different countries is reviewed. It is noted that the study of this topic is made difficult by the unavailability of suitable subjects, as well as by wide differences between subjects in terms of age, intelligence level, and language spoken. A combined neurolinguistic and neuropsychological model for bilingualism is proposed as feasible and useful. Four practical applications are mentioned, including the development of screening batteries for bilinguals with emphasis on polyglot dyslexia; and adaptation of the Luria-Nebraska Neuropsychological Battery for purposes of diagnosing polyglot dyslexia. (SEW)

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Polyglot Dyslexia

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Introduction

While the coining of the term dyslexia is generally attributed to Rudolph Berlin, an ophthalmologist in Germany, increased attention to the phenomenon now known as learning disability did not start until approximately three decades ago (Wagner, 1976). Learning disabilities are now considered an umbrella concept, meaning that the disabilities occur in various forms, such as reading (dyslexia), spelling (dysorthographia), or arithmetic (dyscalculia).

Due to the nature of the phenomenon, a variety of professionals have become interested in it and carried out research in their respective fields. These researchers come from a variety of scientific fields, among them general medicine, neurology, psychology, education, and rehabilitation, to name just a few of them. More recently, specialized disciplines have focused even more narrowly on the task, such as neurolinguists, neurobiologists, and neuropsychologists. The syllable "neuro" in these specialists' names clearly indicates the theoretical direction they have taken for their research contributions.

One of the theoretical aspects of causative factors in dyslexia today is the notion of Minimal Cerebral Dysfunction implying that we are not dealing with brain damage, such as lesions, but with poorly

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coordinated parts. This notion was followed earlier by Orton (1937) who saw dyslexia as an interference between the two hemispheres of the brain. He called such condition strephosymbolia, meaning scrambled symbols.

Prior to Orton, Broca in France and Wernicke in Germany had pinpointed the speech areas in the left hemisphere of the brain and thus focused attention on speech dysfunctions, specifically aphasia. Subsequent research spawned great interest in this area and helped chrystallizing the theoretical underpinnings of cerebral functions as well as dysfunctions and disorders. Aphasia was studied not only in people of one native tongue, but two or more. Theories of polyglot aphasis have contributed to the understanding of cerebral functions, no doubt. The research of various investigators has substantially contributed especially in the theoretical realm with three basic theories now contained in the literature: Ribot's theory (1882) states that patients recover earlier-learned items before later-learned items after brain damage; Pitres (1895) suggested that the language which recovers first is the one used most; and finally, later investigators felt (e.g., Krapf, 1957, and Minkowski, 1965) that affective factors play a role in which language returns first.

The Problem

In a comprehensive survey of the bilingual brain, Albert and Obler (1978) describe research done with neuropsychological and neurolinguistic aspects of bilingualism, but fail to make any mention of cases in which a reading or language disability (dyslexia) occurs in

people without known brain damage. One could assume that little if any mention of such cases is made because they do not exist in the literature, rather than assuming that they are of no interest to the scientist. As far back as 1877, Kussmaul, a German physician, in his compendium on speech disturbances describes various speech disorders and mentions explicitly that there was one particular kind of speech disorder described in the literature that did not fit in the general category of aphasia. Here is Kussmaul's verbatim account:

> We have discovered cases in the literature, which are known as aphasia but should not be designated as such, inasmuch as the patients were able to express themselves in speaking and writing. They were neither inarticulate (incapable of speech) nor illiterate (incapable of writing); but despite an acute sense of hearing they could no longer comprehend words they heard or, despite good vision, they could no longer read words they say. For the sake of brevity, these pathological disabilities are named: word deafness and word blindness (caecitas et surditas verbalis).

Due to the colorfulness of polyglot aphasia, the relevant literature contains at least some accounts of polyglot aphasia. The accounts are mostly in the nature of case studies since experimentation with polyglot subjects appears hardly feasible because of the scarcity of available bilinguals with brain damage as well as the diversity of symptoms. However, the study of polyglot aphasia has contributed to the psychoneurological theory as well as practical applications in the areas of treatment and rehabilitation. As will be described below, the same attention has not been afforded bilingual individuals with specific learning disabilities, such as dyslexia.

Bilingualism

The study of bilingual individuals is made difficult due to the fact that there exist a variety of bilinguals. The definition depends usually on the mode of language acquisition for the two or more languages. Even though Albert Scheitzer once said that one can only have one mother tongue, the term bilingualism is generally accepted. In their introductory chapter, Albert and Obler distinguish among three types of bilinguals, namely:

1.	Balanced	There is native proficiency in both languages.
2.	Dominant	The individual is more fluent in one than in the other language.
3.	Second Language Learners	Individuals who study language as a second language, such as in courses offered in high school or college.

The above tripartite classification is further complicated by the various modes of acquisitions. For example, while the dominant individual is more fluent in one than in the other language, under what circumstances does he use one over the other? Or in the case of native proficiency of the balance individual, when were the two languages acquired, i.e., at what developmental stages? The matter of time of acquisition is a very crucial one in this connection and can become even more significant when such person becomes aphasic due to cerebral insult.

To the theorist as well as researcher, the question of brain mechanisms and functions are of further interest. Albert and Obler again must be cited in this connection (1978, p. 234). The question

of storage has been argued by proposing three types of systems, as follows:

1.	Compound	Languages are stored in a single system.
2.	Coordinate	Languages are stored in a dual system.
3.	Subordinate	One language is dominant, the other subordinate. To avoid mixture, a "switch mechanism" is suggested.

While the compound system is interdependent, the coordinate system is independent. Some of the errors individuals make may give us some insight as to the working of the two different systems.

The educational aspects of the bilingual, especially the bilingual child, has been described by Simoes (ed., 1976) and others.

Polyglot Dyslexia

One of the earliest hints on polyglot dyslexia was given by Critchley (1970) in England when he states (ibid., pp. 16-17) that there have been three instances of dyslexia in Anglo-Arabs, and errors in writing and spelling were detectable in both languages. There is also good reason, Critchley states, that dyslexia is met with among school children in Jordan. He also encountered a bilingual Israeli dyslexic with comparable defects in reading and writing. Similar difficulties were reported to this author by foreign students from Algeria where natives speak French now but learn Arabic in school as a cultural tradition and awareness.

What comes readily to mind is the fact that two different languages may be confusing to the bilingual because of the dissimilarily of the two languages. If one language has the left-right movement on the

page while reading, another one may have the exact opposite, namely right-left orientation on the printed page. Thus a child may easily confuse was for saw in English, due to this confusion. A German immigrant whose acquired language is English may say sixty-two when in fact he wants to say twenty-six, simply because in German the ones are spoken before the tens, while in English this is the opposite, i.e., first the tens and then the ones. Critchley feels that the possibility of bilingualism placing an "added burden" on the poor reader is evident.

It is argued by the writer that the scientific study of polyglot dyslexia can be fruitful and informative in the same way as the study of polyglot aphasia yielded important information regarding brain functions and dysfunctions. The information can be useful for both theory and pragmatic applications.

As far as the terminology is concerned, various terms have been mentioned in the past, e.g., multiple dyslexia, learning difficulties in bilinguals, or bilingual dyslexia (Wagner, 1976). Perhaps the choice of Polyglot Dyslexia is the most appropriate one since multiple dyslexia may refer to conditions in one language where the person has two or more different deficits, such as reading, handwriting and arithmetic (dyslexia, dysgraphia, and dyscalculia, respectively). It also conforms to the existing and accepted term of Polyglot Aphasia in the literature.

Relevant Literature

A survey of the literature on polyglot dyslexia reveals a dearth of information and relevant studies. The mentioning of Critchley's remarks (1970, cited above) referred to Arabic and Israeli children with bilingual difficutlties. One would assume that countries with large foreign populations, such as minorities, have studied the phenomenon in question. For example, in Western Germany there are now 450,000 foreign children in the public schools according to estimates in 1976/77 (Langenohl-Weyer, et. al., 1980). However, no specific studies are available on this population except for descriptions of their linguistic and cultural adjustment. The composition of these foreign children seems to change rapidly. For example, Alpinar (1980) lists as the primary proportion 27% Italian children in 1965/66, while in 1874/75 the greatest number of foreign children were Turkish with 29%, followed by 18% Italians. The percentage of foreign children who were referred for special education services were 2% of all foreign children in public schools, a number considered too low an estimate (Schnorr, 1982).

Griessmann (1974) points out that legasthenia (dyslexia) occurs more frequently in Anglo-Saxon countries because of the lower sound-symbol relationships. When the same sound string has two different spellings (homophones), the child is required to store different spellings in two different ways, causing confusion. Griessmann speaks of a Speicherungs-prozess (storage process) which is assumed weak or deficient in the dyslexic child.

Wagner (1981) mentions a case of a Chinese adolescent whose English was limited because both parents and grandparents spoke Chinese in the

home exclusively. On the Wechsler Test (WAIS), this student defined the word "assemble" as "the anchor or cross is a symbol - the shape." The same student defined "conceal" as patching up a sewer, and "hasten" as having something to do with hate. Obviously the student had auditory discrimination difficulties which may well stem from his bilingual orientation rather than a monolingually confined auditory deficit.

Tarnopol and Tarnopol (1976) surveyed the programs on dyslexia in sixteen countries, but only one country (Virgin Islands) mentioned the problem of bilingualism in such conditions. In the Virgin Islands, Creole is spoken and is described as a dialect of English but as a language in its own right. Creole differs from English in vocabulary and syntax. However, the authors on the chapter of the Virgin Islands point to the effects of Standard versus Creole English on culture and motivation to learn, rather than pointing out any difficulty with a dual language system per se.

Jung (1978) tried to compare the mistakes of sixth and seventh graders in Germany to assess the types of mistakes made. The students spoke German as their mother tongue and were enrolled in English language classes which, of course, is a foreign language in German schools. His experimental group consisted of 11 sixth and seventh graders, his control group was comprised of 27 seventh graders. All students in the experimental group were dyslexic, the control group participants were not. A dictation in English (the foreign language under study) was given to both groups and mistakes were analyzed according to type. Mistakes were typically made by both groups, such as "flighty" errors (e.g., an instead of and). The primary error made to a significantly higher degree among the dyslexics was a reversal error, as follows:

adn	for and
form	from
vrey	very
Jhon	John
wath	what

Comparable data for oral reading was not obtained. Jung also points out that repeated dictations of the same text did not always produce the same reversal errors in the same words, but were relatively inconsistent over time. Such statements should not surprise the experienced teacher of dyslexic children.

In discussing typical errors of foreign-born school children in Germany with regard to their errors in academic work, Schnorr (1982) lists seven different error categories and comments on their relevance or comparability regarding dyslexia. Here are three examples of the error categories and Schnorr's remarks in juxtapostion:

Inability to recognize words and letters again	One must assume the same causes in German children
Letter or sound reversals or transpositions	Examination for dyslexia by a school psychologist is indicated
Directionality of reading on the printed page	One must first assess directionality in the child's mother tongue before drawing conclusions as to the type of disturbance.

When discussing number reversals in arithmetic (such as 14 and 41), Schorr again points out the relevance to dyslexic conditions.

The experimental and systematic study of polyglot dyslexia is made difficult by the unavailability of suitable subjects as well as the wide differences between subjects in terms of age, intelligence level, and especially languages spoken (degree of profiency and manner of acquisition). Two French immigrants speaking English as their acquired tongue can hardly

be compared because of the wide array of variables that must be controlled in an experiment. Even if one were to compare intrinsically similar subjects, the extrinsic (environmental) factors would be overwhelming.

Assuming that one can accept the proposition of polyglot dyslexia being a worthwhile subject for scientific inquiry, the topic can be ciscussed in two broad areas, namely relevance to psycholinguistic theory and pathology as one, and diagnostic as well as remedial considerations as the other.

Theoretical Considerations

In their basic compendium on neurolinguistics, Albert and Obler (1978) have given an overview of existing theories regarding bilingualism. Some of the earlier studies were concerned primarily with polyglot aphasia. However, these aphasiologists dealt with various forms of behavioral and anatomical distinctions between two languages. Linguists and psychologists, in more recent years, have focused on various forms of interference of the two languages. Based on previous research, Osgood and Ervin (1954) suggested a model of compound as opposed to coordinate bilingualism. In their model, the manner in which a second language is learned determines whether the two languages are stored as a single, compound system, or as a dual coordinate system. In still other studies (e.g., Riegel, 1968; Diller, 1974) the compound-coordinate model has not been viewed as a clear-cut dichotomy, but as a continuum. When trying to avoid interference, a "switch mechanism" is suggested.

Kirsten and de Vincenz (1974) have come up with yet another model by using the generative-transformational hierarchy first introduced by Chomsky (1962). They proposed that the extreme coordinate bilingual controls two

grammars which are unrelated except at the deepest levels of universal language processes and thought. Coordinate bilinguals have separate surface structures but common deep structures, while compound bilinguals have a connected surface structure, side by side.

It appears to the writer that a model positing surface and deep-root structures has an analogy to brain functions, especially those suggested by the Russian neuropsychologist Luria who proposed "chains" or hierarchies of neurological functions. Such model could possibly be tested with Golden's (1982) Luria-Nebraska Neuropsychological Battery as an empirical measure of underlying brain functions. A more detailed model will be offered by the writer elsewhere.

A combined neurolinguistic and neuropsychological model for bilingualism appears feasible and would make the model more potent in terms of explanatory power as well as proximity to physiological functions. The role of polyglot dyslexia could be an important contributing factor here in as far as "learner errors" could be traced in the model in the same way as, by analogy, isotopes are traced in the bloodstream. Reversal errors would be the first challenge for the proposed model since no satisfactory explanations exist to date as far as theory is concerned.

Research appears handicapped by the infrequent availability of bilingual subjects and would have to confine itself at first to case studies before any experimental groups can be formed and evaluated with any validity.

Practical Implications

The following practical applications could possibly be derived from the suggested research blueprints. However, such endeavor is not considered the primary purpose of academic inquiry.

1. Development of screening batteries for bilinguals, with emphasis on diagnosis of Polyglot Dyslexia.

2. Adaptation of the Luria-Nebraska Neurppsychological Battery for purposes of diagnosing Polyglot Dyslexia. Such adaptation would require certain verbal subtests in the Battery to be translated in several languages, as needed.

3. Introduction of preventive programs in bilingual education using methods and techniques used for monolingual education that applies to methods and techniques used for monolingual dyslexies. Such methods would include Montessori-type approaches, the tactile-kinesthetic method, Cuisinaire rods, or similar approaches.

4. Treatment of Polyglot Dyslexics by focusing on commonality of errors, such as reversals and structural mix-ups, to remediate the deep structures rather than surface structures. If this approach proves to be feasible, it would be more effective than treating only one language of the bilingual. Usually, only one language is dominant in the bilingual at a given time.

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